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Appl. No. 09/978,346

REMARKS/ARGUMENTS

All above indicated paragraphs (besides first one beginning at line 12 of page 13, which was amended because of correct first introduction of heat chamber 11) and drawings have been amended for the following reason: in the application embodiments, unwinding flyer 24 and winding flyer 22 are rotated in the same direction by electric motor 27 that needs to be amended, i.e., flyers 24 needs to be rotated in opposite direction relative to flyer 24 in order to unwind the leading fiber loops at the delivery ends of the conveyer-drawing members, as described in the specification and claims.

Attached hereto is a marked-up version of the changes made to the specification and drawings by the current amendment. The attached pages are captioned «**Version with markings to show changes made.**»

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted by applicants:

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Paragraph beginning at line 12 of page 13 has been amended as follows:

An one embodiment of the invention for continuous drawing of fibers in form of coiled fiber loops is illustrated in Figs. 1A-1C. Fig. 1A shows a longitudinal view of an invented apparatus for the fiber drawing which has the following main parts: (a) a conveyer-drawing structure for conveying and simultaneous drawing a fiber G in the form of coiled fiber loops, (b) a feed device for feeding fiber G to the conveyer-drawing structure at an inlet speed and laying successive controlled fiber loops around the conveyer-drawing structure at the beginning of the fiber drawing, (c) a take-off device for taking continuously off the leading fiber loops from the conveyer-drawing structure at the end of the fiber drawing and conveying the drawn fiber from the fiber drawing apparatus either to the next stage of the fiber making process or to the receiving package at an outlet speed, (d) a driving mechanism for driving parts of the conveyer-drawing structure, the feed device, and the take-off device, and (e) a heat chamber 11 for heating fiber G while the fiber being conveyed and drawn. For a detailed description see below.

2. Paragraph beginning at line 4 of page 14 has been amended as follows:

The conveyer-drawing structure comprises support housings 12 and 14, support bearings 16 and 18, bearings 13 and 15, bearings 52 and 53, ~~a drive shaft 20~~ drive shafts 20 and 21, a tubular support 32 (composed of two parts), and radial arms 46, 48, 62, 62', and 62" (six of each arm). The radial arms are arranged in an isosceles hexagon when viewed in cross section. Bearings 16 and 18, which are mounted in housings 14 and 12 respectively, ~~and support shaft 20~~ support one end of shaft 20 and one end of shaft 21 respectively. ~~Bearings 13 and 15~~ Two bearings 13 and two bearings 15 are mounted in tubular support 32. They support shafts 21 and 20 respectively. ~~Shaft 20 supports tubular support 32 (by means of bearings 13 and 15), and support 32~~ Support 32 supports radial arms 46, 48, 62, 62', and 62". Arms 48 support bearings 52. Bearings 52 can be moved along and secured in slots 50 in arms 48, angle α of spindles 54 being changed. Arms

62 support bearings 53. Bearings 53 and 52 support shaft portions 54a and 54b of spindles 54 respectively. Arms 62' and 62" support spindles 54 to prevent sagging.

3. Paragraph beginning at line 5 of page 15 has been amended as follows:

(c) The take-off device comprises a pair of driven conveying rollers 28, a roller 28', a weight 30, an fiber unwinding flyer 24, an inlet 24a, a third inner guide channel ~~20b~~ 21a, a fourth inner guide channel 24b, a polytetrafluoroethylene tube (not shown), and shaft ~~20~~ 21 (it is also a part of the conveyer-drawing structure, see above). Flyer 24 is secured to shaft ~~20~~ 21 at the delivery ends of spindles 54. Flyer 24 has inlet 24a at its free end and fourth guide channel 24b communicating with third guide channel ~~20b~~ 21a passing through the end portion of shaft ~~20~~ 21. Roller 28' supports weight 30. The polytetrafluoroethylene tube (not shown) is inserted into channels ~~20b~~ 21a and 24b up to inlet 24a, the fiber passing through the channels with very little friction.

4. Paragraph beginning at line 15 of page 15 has been amended as follows:

(d) The driving mechanism comprises ~~an electric motor 27, a driving gear 25, shaft 20~~ electric motors 27 and 27a, driving gears 25 and 25a, shafts 20 and 21 (~~it is~~ they are also ~~a part~~ parts of the conveyer-drawing structure, the feed device, and the take-off device, see above), six chain wheels 56, a chain wheel 60, a chain 58, universal joints 61, shafts 55, a shaft 59, and an adjustable transmission (not shown). Gear 25 is secured to shaft 20, and gear 25a is secured to shaft 21. Chain wheels 56 are secured to shafts 55 mounted in arms 46 for rotation. Chain wheel 60 is mounted on shaft 59 for rotation and connected by the adjustable transmission (not shown) to shaft 20 (Fig. 1C). Shaft 59 is secured to arm 46. Chain 58 passes over wheels 56 and wheel 60. Universal joints 61 are mounted on the other ends of shafts 55 and connected to shaft portions 54a of spindles 54 (Figs. 1A and 1C).

5. Paragraph beginning at line 25 of page 15 has been amended as follows:

(e) ~~The heat chamber 11~~ Heat chamber 11 envelopes the conveyer-drawing structure (besides support housings 12 and 14 and bearings 16 and 18), the winding and unwinding flyers, and the driving mechanism besides ~~motor 27 and gear 25~~ motors 27 and 27a and gears 25 and 25a. It is supplied with hot air, hot inert gas, or superheated steam.

6. Paragraph beginning at line 3 of page 16 has been amended as follows:

Electric motor 27 rotates gear 25 and hence rotates shaft 20 in bearing ~~16, 18, 13, and 15~~ 16 and two bearings 15. Shaft 20 rotates carrier 35 with flyer 22, ~~flyer 24,~~ shafts 36 and 38, and pinions 40 and 42 about the central axis. Pinions 40 and 42 roll on sun gears 34 and 44 preventing support 32 from turning about shaft 20 and the central axis. Thus the parts of the conveyer-drawing structure supported by tubular support 32 are prevented from rotation about the central axis. Electric motor 27a rotates gear 25a and hence rotates shaft 21 in bearing 18 and two bearings 13. Shaft 21 rotates flyer 24 about the central axis.

7. Paragraph beginning at line 9 of page 16 has been amended as follows:

Spindles 54 are rotated by means of ~~electric motor 27, gear 25, shaft 20~~ electric motor 27a, gear 25a, shaft 21, the adjustable transmission (not shown), wheel 60, chain 58, wheels 56, shafts 55, and universal joints 61. Shaft portions 54a and 54b of spindles 54 rotate in bearings 53 and 52, respectively.

8. Paragraph beginning at line 23 of page 16 has been amended as follows:

Both flyers 22 and 24, rotated in opposite directions, make one revolution while spindles 54 make one revolution. As this takes place, each fiber loop travels along the central axis one pitch of the fiber coil. Simultaneously the fiber coil is slowly rotated about the central axis, and each point of the fiber loop passes along the loop circumference a distance equal to a spindle circumference (measured at inner diameter of the thread or spiral groove). The loops increase their circumference with each spindle revolution, the fiber gradually being drawn by rotating

spindles 54 at the heat chamber temperature. The leading fiber loops are continuously unwound by flyer 24 at the delivery ends of spindles 54. The corresponding length of the fiber is conveyed through inlet 24a and guide channels 24b and ~~20b~~ 21a by the conveying rollers 28 and roller 28'. The fiber is conveyed either to the next stage of the fiber making process or, through a winder (not shown), to the receiving package (not shown). The fiber does not have permanent contact points with the spindles. This provides the uniformity of the dimensions and physical properties of the drawn fiber.

9. Paragraph beginning at line 19 of page 18 has been amended as follows:

The chains are driven by means of ~~electric motor 27, gear 25, shaft 20~~ electric motor 27a, gear 25a, shaft 21, the adjustable transmission (not shown), wheel 60, chain 58, wheels 56, gears 72 and 74, and wheels 68 and 68' (Figs. 2A, 2B, and 2D). Both flyers 22 and 24, rotated in opposite directions, make one revolution while chains 66, 66a, and 66b move one chain pitch. Flyer 22 lays controlled fiber loops about the receiving ends of chains 66 placing each loop in contact with guide semi-rings 77 of displacing members 76a and 76b (Fig. 2C) which facilitate the fiber loop conveying along the central axis and the fiber drawing. The rest of the operation is the same as in the case of the embodiment of Fig. 1A.

10. Paragraph beginning at line 3 of page 20 has been amended as follows:

Chains 80 are driven by means of ~~electric motor 27, gear 25, shaft 20~~ electric motor 27a, gear 25a, shaft 21, the adjustable transmission (not shown), wheel 60, chain 58, wheels 56, gears 72 and 74, and wheels 68 (Figs. 3A and 3E). At the same time gears 84 rotate gears 86 and long gears 90 (Figs. 3E and 3F). Gears 90 rotate gears 100 and rollers 98 while rollers 98 are moved by chains 80 from the receiving ends, along gears 90, to the delivery ends. Flyers 22 and 24, rotated in opposite directions, make one revolution while chains 80 move one chain pitch. Flyer 22 lays controlled fiber loops about the receiving ends of chains 80 placing each loop in grooves 98a of rollers 98 (Fig. 3C and 3D) and forming the layer of coiled fiber loops supported by the rollers. Rollers 98, as a part of the displacing members, facilitate the fiber loop conveying along the central axis and the fiber drawing. As the fiber loops travel to the left along the central

axis, as viewed in Fig. 3A, the fiber coil is rotated about the central axis by rollers 98. This changes contact points between the fiber and the rollers thus resulting in a better uniformity of dimensions and physical properties of the drawn fiber. Rotation speed of rollers 98 and the fiber coil is adjustable. The rest of the operation is the same as in the case of embodiment of Fig. 2A.

11. Table with title "Reference Numerals in Drawings" beginning at line 4 of page 12 has been amended as follows (see next page):

Reference Numerals in Drawings

11	heat chamber	55	shaft
12,14	support housings	56	chain wheel
13,15	bearings	58	chain
16,18	support bearings	59	shaft
20, 21	drive ~~shaft~~ shafts	60	chain wheel
20a	first inner guide channel	61	universal joint
~~20b~~ 21a	third inner guide channel	62, 62', 62"	radial arms
22	fiber winding flyer	66, 66a, 66b	chain sections
22a	outlet (of the fiber winding flyer)	68	chain wheel
22b	second inner guide channel	69	shaft
24	fiber unwinding flyer	68'	double guide chain wheel
24a	inlet (of the fiber unwinding flyer)	70, 70', 70"	radial arms
24b	fourth inner guide channel	71, 71', 71"	radial arms
25, 25a	driving ~~gear~~ gears	72	beveled gear
G	fiber	74	beveled gear
26	feed roller	76a, 76b	fiber displacing members
27, 27a	electric ~~motor~~ motors	77	guide semi-ring
28	conveying roller	78, 78', 78"	support parts
28'	roller	80	chain
30	weight	82	shaft
32	tubular support	84, 86	beveled gears
34	first sun gear	88	shaft
35	planetary carrier	90	long gear
36, 38	shafts	92	shaft
40,42	planetary pinions	96	support part
44	second sun gear	98	roller
46, 48	radial arms	98a	circumferential groove
49	radial arm	100	gear
50	guide slot	102	ball bearing
52,53	bearings	104	shaft
54	spindle	106, 106a	pins
54a, 54b	shaft portions		